

Introduction to L^AT_EX

Austin Che

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1 Overview

It seems the common way to do word processing these days is for the user to worry about how the data is to be laid out. For example, the user could decide that the section title should be bold and 18 points. But what happens when its 2 weeks later and the next section is added? It is up to the user to use the same style. With \LaTeX , you just tell it that you have a section title and it will always be consistent. With \LaTeX , you will never have to worry about where the tabstops go or if things will line up right.

1.1 What is \LaTeX ?

\LaTeX is a document preparation system created by Leslie Lamport in 1985 built on top of a typesetting language called \TeX . \TeX (rhymes with “blech!”) was designed by Donald Knuth in 1984. \TeX takes a sequence of typesetting commands from an ASCII file and converts it to a device independent file format also known as a DVI file. To view DVI file you can use the `xdvi` command or, as is probably more common, you can use `dvips` to convert the DVI file to postscript for printing.

The name \TeX (and subsequently \LaTeX) and the strange way that it is displayed is supposed to be a demonstration of the power that \TeX has in typesetting.

1.2 So what’s the big deal?

Well it wouldn’t be much if that was all \TeX was. But there is one other key feature and that is macros. A macro package can hide a lot of the typesetting details. And that’s exactly where \LaTeX comes in. \LaTeX is a macro package for \TeX which encourages content over structure.

\LaTeX is used in a variety of places, especially in science fields which have many special symbols not found on the standard keyboard. \LaTeX is used for most technical articles and math and computer science books. And it’s completely free!

The only drawback is that it is not as easy to use as some common word processors. It is like a mini-programming language and requires some getting used to, but it is very powerful so it is certainly worth learning. The rest of the document will explain what goes into creating \LaTeX files. Note that this is not meant to be a comprehensive reference. A \LaTeX reference is needed if you wish to start seriously using \LaTeX .

2 Basics

2.1 Comments

A ‘%’ in the source file denotes a comment and everything to the right of it is ignored by \LaTeX .

2.2 Document Basics

- Each document is of a specific class which describes its logical structure based on pre-defined styles. Within the document, you can use styles to determine what the actual formatting will look like.
- Every document should begin with “`\begin{document}`” and end with “`\end{document}`.” Anything that comes after the “`\end{document}`” is ignored. Everything before the “`\begin{document}`” is called the preamble.
- \LaTeX commands start with a ‘`\`’ and are followed by one or more characters which *is case-sensitive*. Many commands have arguments. Required arguments will always be between ‘`{`’ and ‘`}`’ while optional arguments will be between ‘`[`’ and ‘`]`’. For example, “`\textbf{Bold!}`” produces this: **Bold!**
- One command that must appear before anything else in your file is the “`\documentclass{class}`” command which specifies the overall class for the document. Standard document classes are article, report, book, slides, and letter.

For example, the following is a minimal \LaTeX document.

```
\documentclass{article}
\begin{document}
  %% This is a comment
  Look what I can do!
\end{document}
```

3 Environments

3.1 Text Styles

Environments provide some style to many paragraphs. Environments have the following format:

```
\begin{environment-name}
...
...
\end{environment-name}
```

For example, this

```
\begin{quote}
  It is better to remain silent and be
  thought a fool than to speak and
  remove all doubt. -Mark Twain
\end{quote}
```

produces this as output:

It is better to remain silent and be thought a fool than to speak and
remove all doubt. -Mark Twain

3.2 Placement of Text

Other environments include center, flushleft, and flushright, which control the placement of the text within the environment.

3.3 Lists

There are three list environments which are itemize, enumerate, and description. In each one, \item is used to begin new items.

3.4 Tabbing

There is also a tabbing environment. Within it, you are allowed to set tabstops and tab to them. You set tabstops with the \= command and go to the next tabstop with \>. Unlike the normal tab key, the \> will always move to the next tabstop whether that tabstop is to the left or right of the current position, so text can be overwritten if the tabstops are too small.

3.5 Verbatim

Another environment is the verbatim environment. Any text within this environment will be taken literally and there are no special characters within this environment.

4 Math

L^AT_EX has a math mode that makes it extremely easy to enter mathematical formulas. There is a math environment for formula that appear right in the text. This environment is so common that there is a short form for it: $\$...\$$. For example, here's a mathematical formula: $\alpha + \beta = 3 * (\frac{\sqrt[3]{2}}{2})$.

5 Miscellaneous

5.1 Special Symbols

The special symbols in L^AT_EX are: # \$ % & _ { } \ ^ ~

The first seven of these can be entered by putting a backslash before the character (e.g. \%). The other characters can be entered along with many other special characters such as any imaginable accent on any character. For example, \backslashbackslash will insert a backslash. See a L^AT_EX reference for information on how to enter other special symbols.

5.2 Quotes

There are two different types of quotes, single quotes and double quotes. The two different quotes characters that LaTeX uses are ‘ and ’. The first one is used for the open quote and the second one is used for the closing quote. In the case of double quotes, two are used. *The double quote character itself " is almost never used.*

5.3 Dashes

Long dashes are typed as three dashes in a row like --- A shorter dash is typed with two dashes and a single dash is used for hyphens.

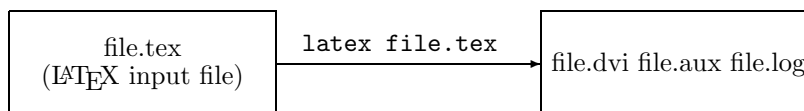
5.4 Title Page and Table of Contents

The title, date, and author can be defined in the document. For example, this document contains `\author{Austin Che}` as one of its very first lines. Once these are defined, if you include `\maketitle` then a title page will be created for you.

If you include `\tableofcontents` in the document, a table of contents will automatically be generated. It may be necessary to run a document through LaTeX twice for this to work since it generates the table of contents as it processes the document and doesn't include the new table of contents until the next time it is run.

6 Compiling

So you've got your LaTeX source file. Now what? You have to put the file through the `latex` program which will spit out a DVI file in addition to a LOG file and a AUX file that is used internally by LaTeX. If all goes well, then you should now be able to run `xdvi` to view the output.



6.1 Errors

But what if all doesn't go well? While running a LaTeX input file through the LaTeX processor, it is possible for some rather ugly looking error messages to be spit back at you. For example, this can occur if you misspell an environment name. After printing an error, LaTeX will print a '?' and you have several options at this point. The easiest is to just push return and LaTeX will continue processing as if the error never occurred. After all errors are spitted out, then you can go back and correct the errors.

7 Conclusion

The thing to remember while using \LaTeX is not to worry about the typesetting and to just write the content. Let \LaTeX do all the work. Remember that adding extra spaces, tabs, or newlines won't actually do anything in most cases. The whole point of \LaTeX is to provide a consistent style to your document so you don't have to worry about formatting.

Many features were not discussed but hopefully one can get a feeling for the power behind \LaTeX . For those who prefer graphical user interfaces, you can try out `lyx` which is graphical frontend for \LaTeX . With `LyX` you can export files generated by it into a \LaTeX file and from this you can see what \LaTeX commands generate what you see on the `LyX` screen.

8 References

For more information, I would recommend the info pages for `LaTeX`. At a Unix prompt, type `info latex`.